THE REFORM OF THE CALENDAR.

BY CHARLES HARVEY GENUNG.

"The heavens, in growing old, bow themselves down nearer to us, and put us to an uncertainty even of days and months."

MONTAIGNE.

THE period of eight years which elapsed between the 29th day of February, 1896, and the 29th of February, 1904, occupies a peculiar position in the history of our calendar. Although upon reflection all of us will recall the fact, to many of us it will come somewhat with the shock of a surprise to learn, that this eight-year interval without an intercalary day has occurred only once before in England, and only twice before in the history of the world, and that it will not occur again for nearly two hundred years. It is, therefore, appropriate at this time to make a brief review of the struggle of almost four centuries which culminated in the reform of the calendar under Gregory XIII.

The controversy concerning the computation of Easter, which from the middle of the second century had filled the church with strife, reached an official decision at the Council of Nicæa, A.D. 325. Easter was to be the first Sunday following the first full moon after the vernal equinox, which in the year of the Council happened to fall on March 21st. When the Julian calendar was established in B.C. 46, the vernal equinox had fallen upon March 25th. Had the Nicene fathers learned the lesson of this recession of the equinox, they might have avoided one element of confusion; instead of that, they added another by adopting the Alexandrine lunar cycle of nineteen years, and upon these decrees the miraculous filling of the baptismal font set the seal of divine approval. When Julius Cæsar put an end to the confusions of the Roman calendar, he computed the mean length

of the tropical year at 365 days and six hours; he provided for this quadrennial surplusage of twenty-four hours by counting the sixth Calends of March (February 24th) twice in every fourth or "bissextile" year. But the mean length of the tropical year is 365 days, five hours, forty-eight minutes and forty-six seconds. The average annual error, therefore, of the Julian calendar was eleven minutes and fourteen seconds. Thus in every 128 years the error amounted to twenty-four hours, and caused the vernal equinox to fall one day earlier than the Nicene fathers had decreed. This was the solar error. Furthermore, the lunar cycle of nineteen years contained, according to the Julian reckoning, 6,939 days and eighteen hours, whereas the 235 synod months which constituted the lunar cycle actually contained 6,939 days and only sixteen hours, thirty-one minutes and forty-eight seconds. This discrepancy, amounting in 310 years to twenty-four hours, brought the new moon into the sky one day earlier than the golden number required. This was the lunar error. And as the centuries continued to roll up the seconds and the minutes into days, the people became puzzled, the clergy began to make excuses, and the astronomers at last demanded a reform.

The lesser error was naturally noticed first. Although it required 310 years for the lunar error to make the difference of one day, while the solar error in the same period amounted to nearly two days and a half, yet the date of the equinox is not obvious to the people generally, whereas the appearance of the new moon by so much as one day too soon could not fail to attract universal attention. Gregory of Tours had commented upon this phenomenon; but remembering the baptismal font at Nicæa,

"This ilke monk leet olde thinges pace,"

confident that, in God's good time, the heavenly bodies would readjust themselves to the Nicene decrees. The Venerable Bede, observing that the new moon due on April 4th had prematurely appeared on April 2nd, likewise took refuge in the baptismal font; and Alcuin answered a troubled inquiry from Charlemagne in a similar strain. But Master Conrad, writing about the year 1200, when the lunar error had reached nearly three days, was not content to beg the question; he explained it. The sun, moon and stars, he said, God made on the fourth day, but Adam

was not created until the sixth; the moon was three days old when Adam saw it first, and he naturally assumed that what he saw was the new moon,—it was certainly new to him,—and in this pardonable misapprehension it was proper that his descendants should piously follow him.

The first important step in the direction of reform must be credited to the Scotch monk, Halifax, or Sacro Bosco, who in 1232 wrote a compendium of chronology, based upon the standard work of Bede. This compendium is noteworthy in two particulars: The ecclesiastical computation was, for the first time, subjected to an empirical test; and, for the first time, a modification of the Julian calendar was proposed and advocated. This was exactly 350 years before the promulgation of the Gregorian reform. Halifax corrected the Julian year by five minutes, thus rendering necessary the excision of one day in precisely 288 years. This is very close to the 300 year period of the Ptolemaic tables. He noticed also the lunar error; but, checked by his reverence for the Nicene Council, he admonished his readers to tolerate the faulty cycle of the golden number. He did not allude to its disastrous consequences in the Easter computation. These were first pointed out by Johannes Campanus, the chaplain of Urban IV., in his "*Computus Major.*" It is evident that even a slight error in the determination, either of the vernal equinox, or of the full moon thereafter, might make a maximum difference of five weeks in the date of Easter. In 1356 it did so. This possibility Campanus correctly demonstrated, and in so doing he touched the vital point of the reform, around which the fires of theological hatred raged for three centuries, till all Europe was divided into two hostile camps, each reckoning time by different days, and engaging in bloody encounters with reference to the resurrection of the Prince of Peace.

In the course of the thirteenth century, a knowledge of Arabian science began to spread through Europe. Campanus cited Albategni, who fixed the amount of the solar error at one day in one hundred years; he also advocated the thirty-year lunar cycle, which was likewise derived from the Arabs. From Roger Bacon, however, came the first emphatic protest against the confusion into which the calendar had been allowed to fall, and the boldness of his tone derives additional significance from the fact that his protest was addressed to Clement IV. He insisted upon

a modification of the Julian calendar; advocated the Arabian thirty-year lunar cycle; and came very near the truth by calculating the solar error at one day in one hundred and twenty-five years. He pointed out that in 1267 Easter was celebrated one week too late; and it pained him to reflect that, though fasting throughout the week of rejoicing, all Christendom had partaken of meat during Holy Week. He showed that Leo I. and Hilarius had raised objections to the Nicene rule, which was, therefore, regarded not even by the Popes themselves as an article of faith; he concluded with an ardent appeal to Clement to inaugurate "one of the greatest and most splendid reforms ever wrought in the church of Christ!"

This was the age of Dante. It was to be expected that the poet, who seems to have overlooked no fact or phase of his time, would make some allusion to the faulty calendar. In "Paradiso," canto xxvii., we read: "But ere January be all unwintered by that hundredth part down there neglected." Dante evidently had Albategni and the Arabian astronomy in mind, according to which, as we have seen, the annual solar error was the hundredth part of a day. Thus, nine thousand years would suffice to take January entirely out of the list of winter months.

The thirteenth century is further remarkable for an event of the utmost importance to the cause of the reform. Alfonso the Wise, of Castile, himself a proficient mathematician, was irritated by the defects in the current mode of reckoning; he is reported to have offended the pious by saying that, had he been present at the creation, he should have given God good advice. In 1248, this prince summoned a college of astronomers to correct the Ptolemaic tables. Fifty of the most celebrated mathematicians of the time assembled in the city of Toledo; and, in 1252, the same year in which Alfonso came to the throne, the new tables, still known as the Alfonsine, were completed. The mean length of the tropical year was fixed at 365 days, five hours, forty-nine minutes and sixteen seconds. Modern astronomy, with its multiplied facilities and its knowledge advanced by 650 years of study, observation and discovery, has been able to detect in this computation an error of only half a minute.

The contributions of the fourteenth century were few and futile. Clement VI. endeavored to elicit from his mathematicians some exact and feasible suggestion for carrying out the reform,

but they fell to playing schoolmen's tricks with the golden number, and left the problem unsolved and unadvanced. In the fifteenth century, however, the demand for a correction of the calendar became so urgent that it seemed for a time that the agitation was about to pass from words to deeds. Petrus de Alliaco, the distinguished Pierre d'Ailly of the University of Paris, appealed to John XXIII. With epigrammatic antithesis, he called the Pope's attention to the number and eminence of the men who had occupied themselves "*de dierum ac momentorum calculatione,*" instead of "*de denariorum ac monetarum computatione,*" and he was solemnly impressive concerning the sinfulness of continuing to celebrate Easter on the wrong day. The Pope promised to act as soon as the schism in the church should be settled; but, as this was accomplished by his own degradation from office, nothing came of the promise. Pierre's efforts at the Council of Constance were equally fruitless; it was more to the point that Jerome of Prague and John Huss should be burned than that the calendar should be reformed.

Meanwhile the people were obliged to help themselves, as best they could, from actual observation. The errors of the ecclesiastical reckoning exposed the Christians to the ridicule of infidels, and brought the church into intellectual discredit. It was feared, too, that through disregard of the lunar error the new moon might chance to fall on Good Friday; this brought with it the possibility of an eclipse of the sun which would shake popular faith in the miraculous nature of the darkness that covered the earth at the crucifixion. Petitions, reciting these various grievances, were laid before the Council of Bâle in 1434; after much quarrelling it was decreed that seven days should be dropped from the month of May, 1439. The working out of this plan had been entrusted to Nicholas of Cusa, who was thus the first mathematician to come forward with a definite proposal to effect the desired change. He assumed the solar error to be one day in 150 years; the omission, therefore, of seven days would suffice to correct the calendar from the time of the Council of Nicæa.

It is proper to notice, at this point, a slip which is found in some of our books of reference. It is taken for granted that the advocates of reform sought to correct the calendar from the date of the birth of Christ. This was, indeed, several times pro-

posed; but, with the church, the essential point was to maintain the integrity of the Nicene Easter rule and bring the vernal equinox back to March 21st. Accordingly, when Gregory dropped ten days in 1582, he went back only to the year 325, precisely as Cusanus had done in 1434, though reckoning with a different estimate of error.

But Cusanus did not remain faithful to his task; he went over to the rival faction of Eugenius IV.; and the Council of Bâle, in order to avoid an additional cause of strife, abandoned the calendar reform. It is one of the little ironies of history that this should have been made the reason for postponing a reform which was subsequently proclaimed in the midst of the greatest schism that ever rent the church, and which did materially increase the bitterness of the struggle between the Protestant north and the papacy.

In the latter half of the fifteenth century, another effort was made. Regiomontanus, the famous German mathematician, had constructed a calendar in which, by setting down both the ecclesiastical date and the true date of Easter, he endeavored to forestall the ridicule of the Jews and infidels; at least, they should not be able to say that the Christians did not *know* any better.

Regiomontanus was thereupon summoned to Rome by Sixtus IV. to aid in rectifying the calendar. That was in 1476, and in the same year Regiomontanus died. The reform was postponed for another hundred years.

The next step in the weary process was taken by Leo X., who appealed to the universities of Europe. Their reports were laid before the Lateran Council. In the foreground of the discussion stood Paul of Middelburg. His bid for popular approval was most quaint. According to his plan, he said, Easter would never fall later than the seventh of April and might arrive as early as the first of March; Lent would thus occur in a season when the days would be shorter and the unpleasantness of fasting be thereby mitigated. The delays and deliberations, however, seem finally to have disgusted the Pope; for, in the report which he authorized of the acts of the Lateran Council, the matter of the calendar is not alluded to by a single word.

At last, in the Council of Trent, we catch a glimpse of the the goal, though so disguised as to be unrecognizable. The Council came to an end without mentioning the calendar in any

official acts; only at the last session, in 1563, it authorized the Pope to revise the missal and the breviary. This was all. Fifteen years later, Gregory XIII., liberally construing his commission concerning the breviary as including the calendar, took the matter so vigorously in hand that within five years the Gregorian calendar was established in all the countries that acknowledged the authority of Rome.

Aloisio (or, as Ranke prefers, Luigi) Lilio, a Calabrian physician, whose name must be numbered among the immortals, had labored to construct a cycle which, while harmonizing with the conditions of the past, should yet be self-renewing for the future. He accomplished this in ten years, and died. In 1577, his brother took the manuscript to the Pope, who submitted it to the mathematicians. A commission was appointed under the chairmanship of Cardinal Sirleto; Christopher Clavius was its leading spirit. An abstract of Lilio's plan was sent to the Christian princes and the leading universities; the official replies are preserved at the Vatican. Dr. Kaltenbrunner, of Graz, whose scholarly paper on "*Die Vorgeschichte der Gregorianischen Kalenderreform*" must be the starting-point for every student of this subject, has made an analysis of these documents. They must have been dreary reading, but some points of general interest appear. Most of the reports were unfavorable. From the Bishop of Glandeves came the sensible suggestion, as from Petrus Pitatus of Verona forty years before, to drop thirteen instead of ten days, and so go back to the time of Christ. The opposition of the Protestants, he rightly thought, would be thus in a measure forestalled. The University of Vienna also advocated the plan. By this means, however, the vernal equinox would have been restored to the twenty-fifth of March as it was in the time of Cæsar; this would have been in contravention of the Nicene decrees. The few reports that were favorable to the plans submitted by the papal commission betrayed a total inability to deal with the question. One from Genoa thought ten days too much to drop at once, proposed seven instead, and suggested that Gregory's mathematicians get rid of the other three days "*in some other way*"! But from Paris came the most remarkable document. The faculty of the university spoke with a deep sense of its duties towards a world swarming with heretics, among whom it classed all astronomers: any attempt to reform the

calendar was an admission that the Holy Spirit had led the church into error and, by implication, that all who had believed in the Julian calendar would be damned. Thus spoke the Sorbonne at the end of the sixteenth century! With no encouragement from without, and with much opposition from within, the Pope and his commissioners are entitled to the greater credit for the steadfastness with which they pursued their purpose and achieved it. On February 24th, 1581-1582, Gregory XIII. issued the famous bull "*Inter Gravissimas.*" A medal was struck in commemoration of the event, but without mention of Lilio. The head of the Pope was on the obverse; on the reverse appeared the ram with the floral wreath as the symbol of Spring, surrounded by the serpent swallowing its tail as the symbol of eternity; the motto read: "*Anno Restituto MDLXXXII.*"

The Gregorian calendar is based upon the work of Lilio. It might with almost equal justice bear his name, although his plan underwent modifications. Copernicus had corrected the length of the tropical year by four seconds, and the Prutenian tables were substituted for the Alfonsine. It was decreed that "the eclipse of ten days," as Montaigne called it, should take place in October, 1582. The future was provided for, as we were reminded by our recent experience in 1900, by dropping the intercalary days from three out of every four centenary years, a mode of correction which Petrus Pitatus had proposed as early as 1539. With the twenty-ninth of February, 1904, we entered upon a series of leap-years which will not be interrupted until the last year of the twenty-first century. The epacts in the new calendar preserved the same relations as in the old, but they had a new significance: whereas formerly it was the age of the moon on March 22d that was indicated, now it is the age of the moon on January 1st. Thus in Catholic countries the year 1582 lost eighty of its full complement of days, for on the first of January the year 1583 usurped its place. The advantages of the new plan become apparent, when we consider the thirty artificial but ingenious tables by which the modes of correcting the lunar and the solar error are made to harmonize. In the year 2100, these errors will balance each other; the golden number will then agree with the Gregorian Epacts.

The Nicene fathers had not made their Easter rule a canon; to the bull "*Inter Gravissimas,*" however, obedience was exacted

on pain of excommunication. All Catholics, therefore, were obliged to adopt the reform. In Spain, Portugal, and part of Italy the new calendar was introduced on the day specified, Thursday, October fourth, 1582; the next day was October fifteenth, which would have been Monday, but thus became Friday. In France the change was effected two months later from December ninth to December twentieth. Belgium and the Catholic cantons of Switzerland followed suit in 1583, Poland in 1586, and Hungary in 1587.

In Protestant countries the case was very different. Unfortunately, the Pope made no diplomatic efforts to coax the Protestants into acceptance of the changes; on the contrary, he made the reform distasteful and humiliating to them by his ruthless high-handedness. Felix Strieve, in the "Transactions of the Royal Bavarian Academy of Sciences," is authority for most of the details relating to the "*Kalenderstreit*" in Germany. It is his belief that the Pope intended to take the world by surprise, secure the adherence of the Protestants before they quite understood that the reform was due solely to the exigencies of the church, and in this way maintain the papal prestige at the head of an undivided Christendom. He promulgated the bull promptly without waiting for the "scientific justification." The retention of March twenty-first as the date of the vernal equinox plainly betrayed the ecclesiastical nature of the measure; the solar reckoning was thus kept in conformity to the Nicene rule, although it is amusing to note in passing that, in computing the lunar cycle, this rule was violated without compunction. The various arguments adduced by Clavius in support of the reform were, for an astronomer, mere stupid trifling: Christmas should continue to be midwinter, St. John's Day, midsummer, and the days of the greatest martyrs, who for the most part had suffered prior to the Council of Nicæa, would remain more nearly correct, and much else of similar weight. There was, however, one really practical reason for keeping the vernal equinox at March twenty-first; Clavius only dimly hints at it. That reason was that any change in the date of the vernal equinox would render all missals and breviaries useless, thus causing widespread inconvenience and entailing vast expense. Everywhere the needs of the church were to the fore; the Protestants grew suspicious and cautious. Nevertheless, it is possible that by the exercise of a little tact their acceptance

might have been obtained, if only for the sake of uniformity and a more nearly accurate time reckoning. The Reichstag of the Holy Roman Empire had already been summoned when the bull was issued. It assembled early in July. Not until September, however, did the Pope ask the Emperor to introduce the reformed calendar into Germany. This Rudolf II. could have done by imperial edict, and by omitting all reference to the Pope he might have succeeded in establishing the reform. The Duke of Bavaria had already ordered the adoption of the calendar in his realms, but this seemed to Rudolf an infringement of the Imperial prerogative and the order was withdrawn; moreover, the Reichstag, always jealous of its rights, was in session. The outcome of the situation was that, at the instigation of the Pope, the Emperor requested reports from all of the Electoral Princes. The Landgrave of Hesse, who had some reputation as an astronomer, emphatically deprecated any papal intervention. Augustus of Saxony wrote even more vigorously to the same effect. But up to this time there had been practically no opposition from the Protestants; to them it was an astronomical question. Altogether, meaning to please the majority of the princes without antagonizing the people, Rudolf thought he might safely introduce the reform. When at last the storm broke the Emperor had gone too far to be able to retreat with dignity. In September, 1583, he proclaimed the new calendar without any reference to its ecclesiastical character and its papal origin; the necessity of conforming to the usage of other lands was, practically, the only argument advanced in support of the innovation.

But the proclamation came too late. The papal bull had come to the knowledge of Protestants generally. It was no longer an astronomical question. It became a matter of ecclesiastical politics, embittered by theological hatred. It was observed that the reform was expressly based upon an act of the Council of Trent, and of all councils the Tridentine was the most hateful to Protestants. The Catholics all obeyed the edict; the Protestants all refused to obey, except in principalities where they were in a hopeless minority; in Bohemia there was armed resistance; riots occurred in Riga when the first Sunday after the change was celebrated on Wednesday, and in Belgium there were similar troubles. The ten days were dropped out of January, 1584; but the Imperial courts had to reckon by both old and new styles.

It is no matter for wonder that the dropping of ten days should puzzle the common people. It is difficult for even the most lucid expounder to make clear to the untutored the difference between dropping ten days from a calendar and losing ten days out of time; that the sun and the moon and the stars move with inexorable precision, and only the human methods of measuring their movements are at fault; that a few seconds of error gathered up here and there out of the centuries will in time amount to one whole day which the human race has most assuredly lived, but which, in its infinitesimal fragments, the calendar failed to record. To the peasant mind this thought was incomprehensible. Ten days had been taken out of their lives, and the idea was highly disquieting that such a thing could be done by any enactment, whether papal or imperial. Vulgar, tasteless witticisms were everywhere rife. Even the intelligent indulged in cheap ridicule. Osiander maintained that the Pope should not be allowed to eat or drink for ten days, and furthermore advised him to conciliate at once the ten saints who lost a day of honor each, lest they bolt the gates of heaven against him and keep him waiting for ten days outside, where the devil might take him. The indignation of the peasants found expression in many vulgar little squibs and pamphlets. A "*Bauernklage*" in rhymed iambics appeared in 1584; the rhymester complained that nobody could tell when to plough, to sow, to dig herbs, etc.; why, even the birds did not know when to pair, to nest, to sing, and to fly south. Addressing the Pope, he said: "Thy God will certainly hold His last judgment upon thee ten days earlier." Of course, Protestant hatred of the Pope and of all his works embittered the controversy far more than mere peasant ignorance. The new calendar was the "Trojan Horse," and it must not be admitted into the evangelical churches. The pulpit fulminated in language which could not be printed to-day. The Pope was covered with shameful abuse. It was asserted that he wished to establish a monopoly in calendars, now that Luther had ruined his pardon and dispensation business. He wanted to set Germany by the ears, it was charged, in order to ascertain who were opposed to him, and then exterminate them in a second St. Bartholomew. The Protestants did not hesitate to lie, but still further inflamed the people by freely quoting passages from the papal bull which that document had never contained. Super-

stition was enlisted in the strife; the moon on the third of March presented to awed observers the countenance of a veiled woman, who bent low towards the troubled earth and cried: "Woe! woe!"

The Catholics, for the most part, wisely refrained from serious rejoinders. There were some cheap squibs, and in 1590 one Johann Rasch asserted that the birds paired consistently on St. Vincent's day: "Good Catholic birds, more reasonable than many a boorish addle pated man!" A certain nut-tree, too, afforded the Catholics some comfort; it had always remained leafless till St. John's Eve, but on the following day had put forth not only leaves, but blossoms; after 1582 this happened in strict accordance with the new calendar ten days earlier. Branches were sent to the Emperor and the Pope, and pilgrims flocked to see the miraculous tree. Similar stories abounded. From Transylvania came one of a physician whose gout, like an American's hay-fever, kept its annual appointment on a fixed date; from Christmas to Candlemas it plagued him, and in 1582 it piously adapted itself to the Gregorian calendar.

After all, the old calendar was quite as much the work of the hated church as was the new; but this the Protestants never seem to have taken into consideration. Only the most enlightened, like Tycho Brahe and Luther, urged the reform without regard to anything but public utility. Montaigne was perceptibly irritated by the innovation, although, of course, that calm and open-minded rationalist recognized the soundness of the astronomical argument. It made him feel old. "My imagination," he says, "in spite of my teeth, always pushes me ten days forward or backward, and is ever murmuring in my ears: 'his rule concerns those who are going to be.'" But again, reason dominating his rebellious imagination, he says: "There was no more error perceived in the old custom than there is amendment found in this alteration. So great an uncertainty there is throughout; so gross, obscure, and dull is our perception." But it is a curious thing that, even among the intelligent and learned Protestants, there were some, like Mästlin and that dilettante astronomer, the Landgrave of Hesse, who denied the need of any reform. The former, blinded by prejudice or made callous by custom, confidently asserted that, before the error could so increase as to throw the vernal equinox over to Christmas day, the whole world would have gone up in inextinguishable flames, with all its calendars

upon it. As Strieve points out, this belief in the near approach of the world's end was again widespread, and the phrase "in these, our last days" was very common. The year 1588 was set down for sounding the trumpets of judgment-day. In that year, there was to be a conjunction of all the planets which marks the close of one of the great astrological epochs. Others chose 1623 as the date of the world's end; but in either case the unexpired term of the earth's sentence was so short that a reform of the calendar did seem superfluous. Furthermore, Mästlin accused the Pope of caring as little about the end of the world as an "Epicurean scoffer," for he uses the words: *"Calendarium perpetuum."* But it was also Mästlin who put his finger on the really weak point of the Gregorian reform. He insisted that, if any, not ten, but thirteen days should be dropped. This was not a frivolous, but a logical objection. Our reckoning would then coincide with the actual Christian era. But the reform had advanced too far; after all, this was a point rather of historical than of fundamental importance; only the publishers of missals and breviaries could have derived any substantial advantage from a further change which would have affected the dates, but not the reckoning. Luther, who always made his points with small refinement, but with a certain brutal sanity which we call "horse-sense," maintained that the calendar should be reformed without regard either to the Pope or to Easter. At best, the Easter festival was a "wobbling feast," which he compared to an old coat, made worse by patching. The ancient law of Moses concerning the vernal equinox was the old coat; the patch was the rule of the church fathers concerning the "first Sunday thereafter." The purpose of this regulation was, of course, to prevent the coincidence of Easter with the Passover. "Hence," said Luther, in some such language as this, "hence this wobbling and everlasting haggling; let the *'Schuckelfest'* wobble on as it has for 1400 years, and let the princes reform the calendar by secular authority." But Rome controlled many lands and peoples, while secular authority was short-armed; and to the church the determination of Easter was, as we have seen, of the first importance and the real motive of the reform.

The failure of the Protestants to take the entirely reasonable stand of Luther increased the general bitterness of that turbulent time. The double celebration of holidays caused constant strife

and irritation. Catholics were haled to court and their children sent to school on what to them were holy days; where Catholic influence prevailed, quite naturally retaliatory measures were enforced. Business relations, too, became exasperatingly complicated, and this added fresh fuel to the already fierce fires of theological controversy. The action of the German evangelical bodies in 1699 did not greatly improve matters. At the instance of Leibnitz, it was resolved that, in the year 1700, the calendar should pass from February the eighteenth to March first. But the system adopted was astronomical, and would therefore coincide with the Gregorian reckoning only at intervals. It was not until the sane judgment, cold rationalism, and royal influence of Frederick the Great were thrown into the scale that at last the reformed calendar found universal acceptance in German lands. Denmark and the United Netherlands adopted it in the year 1700, and in 1701 the evangelical cantons of Switzerland followed, beginning the new century on January twelfth, for after the centenary year, 1700, eleven days had to be dropped.

In England a bill to inaugurate the reform had been introduced as early as 1585, but it never got beyond a second reading in the House of Lords. It was in 1752, in September, that the eleven days were finally dropped, and the legal year made to begin on the first of January. The riots to which this innovation gave rise are matters of familiar history. Hogarth's composition will be remembered, in which a Whig candidate is represented flattering the prejudices of the mob by displaying a banner on which is inscribed: "Give us our eleven days!" Sweden fell into line in 1753. Then, after this struggle of the centuries to get themselves correctly counted, only Russia remained, as she still remains, true to the errors of the Julian computation. By counting the year 1900 as a leap year, instead of dropping the intercalary day, as we did, their solar error now amounts to thirteen days. The matter has been taken in hand and, as of yore, complications have arisen at the outset. The Russian astronomers, fully aware of the beam in their Julian organ of vision, have nevertheless discovered the mote in the Gregorian eye. Accordingly, they ask the Western world to accept a new calendar which, Professor Glaszenap seriously assures us, will not need correction for 100,000 years. The advocates of this chronometric paragon must see that their course can only lead to a defeat of

all reform. Others, taking counsel of timidity, make this impracticable suggestion: the last day of each long month shall be dropped, so that in less than two years the Russian calendar will be brought into working accord with our own. This would bring confusion into all legal and financial relations on thirteen different occasions, instead of on one only.

The mote alluded to, which has darkened the counsels of the Russian Astronomical Society, is this: the three days of correction dropped out of every 400 years represent a rate of one day in each 133 1-3 years, whereas the error to be corrected amounts to one day in but little more than 128 years. Consequently, in the course of about 4000 years this error will avenge itself by throwing our reckoning one day out. It may be feasible then to consider the present Russian proposal; but, meanwhile, we may safely leave "*dies illa*" to be dealt with by the enlightened astronomers of that remote time.

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